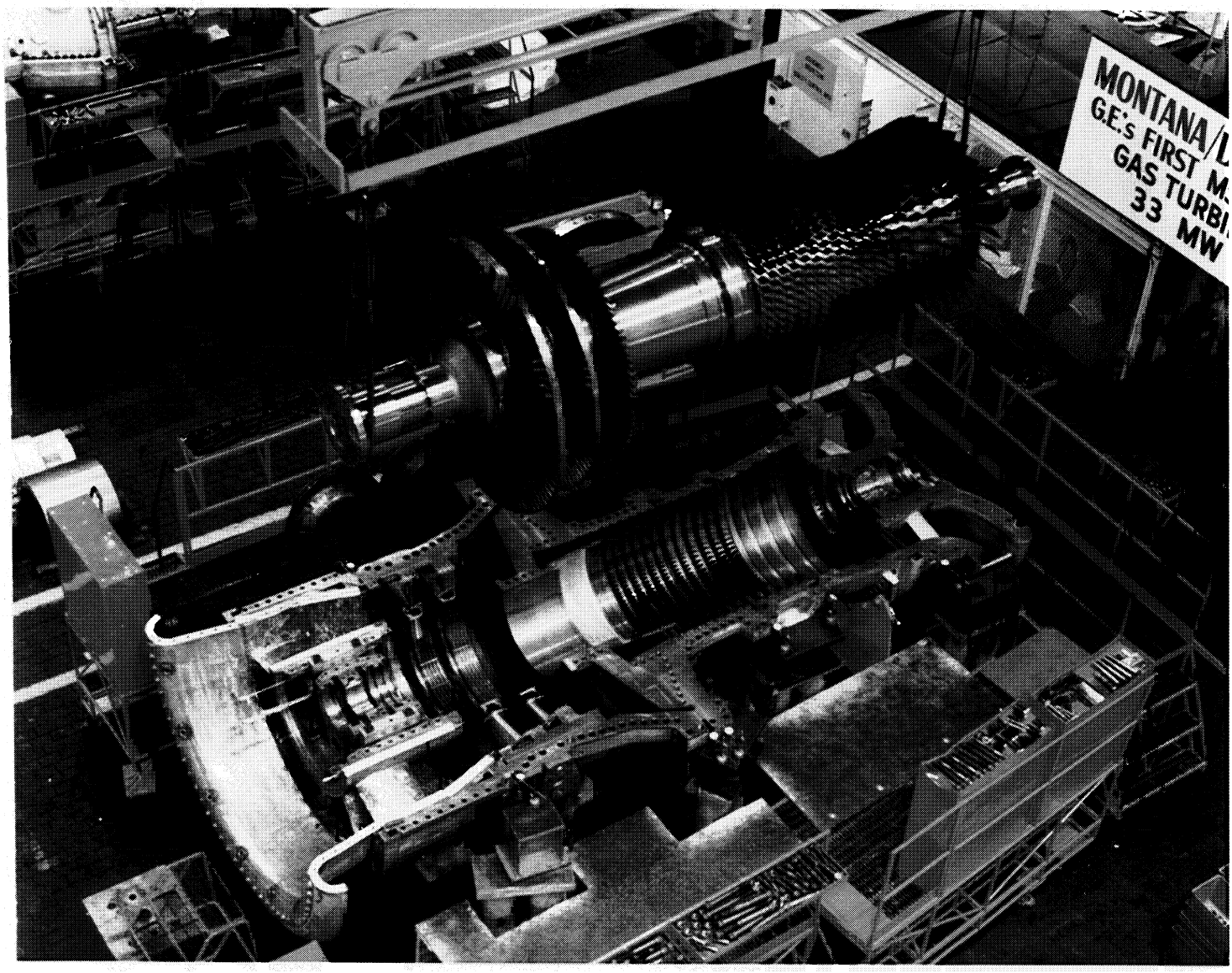

Turbine Blade Research

At General Electric Company's Energy Systems Program Department and Research and Development Center, Schenectady, New York, researchers are exploring a number of advanced methods for converting coal into electricity economically and in an environmentally acceptable manner. One approach, under study for several years, is called "pressurized fluid bed (PFB) combustion." In this concept, steam generated by tubes immersed in a fluidized coal bed drives a steam turbine, while the hot gases created by coal combustion are used to drive a gas turbine. A key technical problem is erosion of blades in the gas turbine, caused by impacts of particles in the combustion gas stream.

Under a contract with the New York State Energy Research and Development Authority, GE's Energy Systems Programs Department has used a COSMIC computer program—developed by Lewis Research Center—in assessing the problem of blade erosion in a PFB environment. Data provided by the COSMIC program and an associated program helped company engineers determine gas velocities and ultimately the velocities of the particles striking the blades, calculations necessary for predicting blade erosion and potential damage. The assessment resulted in a new estimate for the allowable dust load for a modern heavy-duty gas turbine. In the photo is a rotor for a GE heavy-duty gas turbine, one of two types manufactured at the company's Greenville, South Carolina plant which may be used with a PFB system in the future.